In the claims

The listing of claims below will replace all prior versions and listings of claims in the application.

1. (Currently Amended) A [[reflecting]] key encoding station for a two-way quantum key distribution (QKD) system, comprising:

a phase modulator;

a Faraday mirror arranged to reflect pulses of radiation arriving from a [[transmitting]] transmitting/receiving key encoding station through the phase modulator;

a controller, coupled to the phase modulator, that provides a first gating signal to the phase modulator to activate the phase modulator to modulate one of the pulses of radiation; and

a single-photon detector coupled to the controller and gated with a second gating signal from the controller to detect radiation pulses [of light] entering and/or leaving the reflecting key encoding station in a given time interval, said detector and controller being operable to compare the number of radiation pulses entering and leaving the key encoding station in a given time interval to determine if any of the incoming radiation pulses were not sent by the transmitting/receiving station.

2. (Currently Amended) A [[reflecting]] key encoding station according to claim 1, further including a beamsplitter arranged to direct a portion of the [[pulses of]] radiation pulses to the single-photon detector.

3. (Currently Amended) A [[reflecting]] key encoding station according to claim 1, further including a photon-emitting device arranged to provide a calibration radiation beam to the single-photon detector.

4. (Currently Amended) A [[reflecting]] key encoding station according to claim 1, including an optical coupler arranged to direct at least a portion of the

radiation pulses [[of light]] to the single-photon detector.

5. (Currently Amended) A [[reflecting]] key encoding station according to claim 1, including an optical switch arranged to selectively reflect [[the]] radiation pulses [[of light]] to the single-photon detector.

6. (Currently Amended) A [[reflecting]] key encoding station according to claim 1, further including a photon-emitting device optically coupled to the single-photon detector and adapted to emit single-photon pulses in order to calibrate the single-photon detector.

7. (Currently Amended) A method of improving the security of a two-way quantum key distribution (QKD) system, comprising:

providing a [[reflecting]] key encoding station having a single-photon detector; and

monitoring radiation pulses incoming to [[and/or]] and outgoing from the key encoding station in a given time interval using the single-photon detector;

determining an average number of incoming radiation pulses and an average number of outgoing radiation pulses in the given time interval; and

comparing the average number of incoming radiation pulses to the average number of outgoing radiation pulses to detect the presence of an eavesdropper.

8. (Currently Amended) A method according to claim 7, further including calibrating the single-photon detector with a photon-emitting device located within the [[reflective]] key encoding station.

9. (Currently Amended) A method according to claim 7, including gating the single-photon detector so that the single-photon detector detects [[light]] radiation pulses corresponding to a time period during which a phase-modulator in the [[reflective key]] encoding station is activated.

10. (Currently Amended) A method according to claim 9, including sending a gating pulse from a controller to the single-photon detector to gate the single-photon detector.

11. (Currently Amended) A method according to claim 7, including:

randomly activating an optical switch to randomly direct some of the incoming radiation pulses to the single-photon detector; and

gating the single-photon detector to detect the randomly directed incoming radiation pulses.

12. (Currently Amended) A method according to claim [[7]] 11, including:

randomly activating an optical switch to direct some of the outgoing radiation [[pulse]] pulses to the single photon detector; and

gating the single-photon detector to detect the randomly directed outgoing radiation pulses.

13. (Currently Amended) A method according to claim 7, including

randomly activating an optical switch to direct some of both the incoming and outgoing radiation [[pulse]] pulses to the single-photon detector; and

gating the single-photon detector to detect the randomly directed incoming and outgoing radiation pulses.

14. (Canceled).